

FERC Technical Conference
Demand Response in Wholesale Markets
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**Demand Response for Grid Operations and Markets Panel
Comments from Glen Perez, CAISO**

Good Morning, I would like to thank you for inviting the California ISO (CAISO) to speak about Demand Response. I also would like to thank you for allowing David Kathan to visit us in California in January and share his thoughts on Demand Response to our Board of Governors at our Demand Response Market Issues Forum. This type of sharing is so important in the advancement of Demand Response.

In California great strides are underway and the infrastructure is being put in place for achieving increasing amounts of Demand Response; some examples are: implementing our market restructuring; the State setting aggressive Demand Response goals, and implementing the advance metering initiative. With these actions we are moving further down the road to a fully integrated market. We realize that we are not as far along as we would want to be; however, we are moving faster than in the past and know that in working together we will achieve our destination.

The CAISO has been involved in bringing Demand Response into our markets since 1999. We created the Participating Load Program, thus allowing Loads to participate on equal footing with generators in the non-spin Ancillary Service market. Loads can participate year-round. Our largest contributor has been the State's Water Project (as you know pushing water from the north to the south requires many large pumps). In good water years we have had up to 1000MWs bidding and responding. Last July, we had an average of 80 MWs, which we expect to continue this summer (this lower value is due to the State Water Project being involved in one of the California Public Utility Commission's programs).

We also have experience in the development, implementation, and settlement of Emergency Demand Response programs. In 2000 and 2001 we grew concerned about the Investor Owned Utilities Interruptible programs. For these summers we implemented a trial emergency demand response program and a day ahead bidding program. By 2001 we had enrollment of over 1100MWs. However, other events, such as credit worthiness, caused us to end these programs.

These experiences have taught us 4 important lessons:

1. The CAISO must get the Market right for Demand Response to be integrated into the wholesale market. We must have Market rules that allow Demand Response to participate.
2. We must work closely with the State Agencies, FERC, Investor Owned Utilities, and Load Serving entities.
3. Aggregators can bring new customers and grow programs - and at the same time provide reliable Demand Response quantities.
4. We must understand the end user's needs. It is not like: "If you build it they will come."

Now, I would like to address your specific questions:

1. What was the experience with demand response during 2006?

It was an extremely hot summer in 2006, exceeding both the 1-in- 2 and the 1-in-10 demand forecasts. On Monday, July 24, 2006, the CAISO reached an all time peak of 50,270 MW (previous record 44,311 MW).

The three Investor Owned Utilities activated their Demand Response programs due to various triggers in July (triggers such as: temperature, peak load, Stage 1 and 2 emergency declaration). In summary the average load drop for the Control Area in July was approximately 1300 MW¹.

The participation from the CAISO's two programs was: an average of 80 MW of non-spin Ancillary Service and a range from 17- 50 MWs from our Voluntary Load Reduction Program. The Voluntary Load Reduction Program is strictly voluntary and we do not measure the amount of curtailment.

2. Can demand response replace operating reserves, and, if not, what are the obstacles?

For over the last 6 years, the CAISO has demonstrated that certain Load customers can participate in operating reserves, specifically CAISO's Ancillary Services market. These customers have met all the technical requirements to qualify for non-spinning reserves (a 10 minute product) in the Participating Load Program. The Participating Load Program requires telemetry data to be made available and interval metering for use in the settlement process. The Participating Load entity is dispatched based on its bidding pattern and the program is active year-round.

There are obstacles for small Loads to participate in our program. Some obstacles are due to aggregating telemetry data and the scheduling and settlement of demand and the non-spin energy. These obstacles can be overcome, and we are working with stakeholders to resolve these issues.

¹ Based on numbers provided in the CPUC Order Adopting Changes to 2007 Utility Demand Response Programs.

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However, I caution that we cannot look at all technical requirements as obstacles, we must keep in mind that operating reserves are in place to assure the reliable operation of the grid. It is the operating reserves that, in stressed situations, help ensure the grid stability and prevents load from being shed involuntarily.

3. What is the amount of potential demand response available during system emergencies in your regions? How do you know what is a potential demand response? How much of this capability was utilized in 2006?

California is committed to increasing its programs participation in 2007. We all recognize that additional Demand Response is needed to promote system reliability during the summer peak demand periods.

New programs are being added and existing programs are being expanded. The value of increased MWs that will be available in the summer months has not been finalized. However, recent estimates from the California Public Utility Commission are showing total enrollment for Emergency-triggered programs (Day of) are around 1,675 MWs and the Price Responsive, Day Ahead Programs enrollment of 1,058 MWs.

The CAISO have already met with the three Investor Owned Utilities and the CPUC and we agreed to meet regularly to discuss program numbers and experience. We have agreed to also discuss program capacity in real time during the summer months on the "peak day calls" held during challenging periods.

We also recognize that the total enrollment in these programs will not be able to curtail each time the grid is stressed. The quantity that is real will be less than the subscribed quantity. However, our discussions will give us additional feedback to understand the characteristic of each program and provide us a means to gain confidence in the capability of these programs.

4. Several years of experience with ISO demand response programs are now available. Based on this experience, what is your evaluation of these programs?

The CAISO's experiences have shown that Loads can provide needed resources in the Ancillary Services Market. The ability of Loads to curtail and stay off for a known period of time can be very useful in the operation of the grid.

Emergency programs, be they similar to the CAISO's Demand Response Programs in early 2000 or the ones available for the CAISO to call in a Stage 2 emergency provides valuable resources in a contingency. Our experience has shown that when the CAISO calls upon them and the load drops that it can be

significant enough to prevent the continual degradation of operating reserves and provides the needed stop gap to avoid black-outs.

As a policy, the CAISO would like to see an increased emphasis on price-responsive vs. reliability-based/emergency-triggered DR. The CAISO believes the advantages to operations and the markets are best served by DR that can participate and compete like a generating resource in the wholesale electricity markets.

5. What is the status of efforts to coordinate wholesale ISO demand response programs or market designs with retail demand response?

6. What new efforts, market designs or programs are underway within your regions to further integrate demand response?

The CAISO is actively involved in a multifaceted process to be able to encourage more Demand Response in the wholesale market. First and foremost is implementing the market redesign. This will provide the foundation for an integrated forward market and provide the needed Day-Ahead pricing.

Internally, we created a Demand Response Steering Committee, sponsored by Chuck King, Vice President, Market Development and Program Management. The committee will have members from Operations, Policy, External Affairs, Transmission, and other subject matter experts. In addition, the Department of Market Monitoring will be involved.

Externally: we are pursuing many different items:

Short-term: (Summer 2007) we are working with the CPUC and the Investor Owned Utilities to understand the amount of MWs available in their demand response programs. We have also received the Investor Owned Utilities commitment to discuss the values and expectations of the Demand Response programs in the “peak day” phone calls.

Long-term: Collaboration with the California Public Utilities Commission, the California Energy Commission, the 3 Investor Owned Utilities, and Load Serving Entities to identify barriers to the participation of Demand Response resources in the wholesale markets and to see its further integration into the wholesale electricity markets.

Research: Work with the various entities in California that are researching and developing research of new ideas and technologies that will enable greater participation in DR. Clearly the CAISO has a role in helping shape future DR products that support wholesale markets.

7. What needs to be done in the future to fully integrate demand response?

The CAISO must work closely with the California Public Utility Commission, the California Energy Commission, the Utilities, Scheduling Coordinators, and other

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Load Serving Entities to ensure that we communicate the attributes and work collaboratively on the creation of demand response products needed to operate the grid more efficiently and reliably.

Working with the Aggregators that have successfully brought Demand Response to other States and ISOs is needed. We are very encouraged that the California Public Utility Commission has approved the use of Aggregators in the Investor Owned Utilities' programs.

And lastly, as a doctor listens to her patient to understand the patient's problem, then makes the diagnosis, and recommends the treatment; we need to understand the Load customers' needs to fully understand what types of entities can participate in the various programs and what programs are really suited for the markets.

The CAISO has identified Demand Response as a critical item in our five-year strategic business plan. We look forward to working more closely with many entities to achieve our goals laid out in our Demand Response Road Map. However, we have recognized that Demand Response Programs are not the final destination; the destination is to watch demand resources participating in a fully integrated market.

Measurement and Evaluation of Demand Response Resources

The CAISO's experiences in the measurement and evaluation of Demand Response are based on our Participating Load Program and the Trial Emergency Demand Response Programs of 2000 and 2001. I discussed these programs earlier this morning. However for both of these programs we used Settlement Quality Meter Data, as prescribed by our Tariff, derived from interval metering. Interval metering is one of the critical components in the measurement and evaluation of Demand Response. We also recognize that we do not have the experience of dealing with multiple Demand Response programs with a variety of characteristics and measurements. Therefore, my comments are limited to the CAISO's experiences and not necessarily the experiences with all the State of California's programs.

Questions and Answers:

1. What are the current best practices to measure, verify, evaluate and forecast demand resources?

For our Participating Load Program the measurement is simple: just the opposite of how we determine Generation performance. For Load we subtract the Settlement Quality Meter Data after the dispatch from the value prior to the dispatch and the difference should be equal to or greater than the dispatch quantity. This is what the entity will get paid for using our normal settlement process. Presently with the large pump loads, we also have telemetry available, so operations can verify, in real time, if the load is coming off as dispatched.

Having this market product, the Scheduling Coordinator representing the Load, bids into the Ancillary Service Market. Therefore, we know what is available from the entity and it is selected after the market closes it is placed in the dispatch stake. Our experience has shown us that for the pump load, the Ancillary Services provided are extremely reliable.

Forecasting Demand Response is much more difficult and has many variables, such as weather conditions, the day of the week, the number of times Demand Response has been used, timing of notification, and the customer's perceived need for the Demand Response. This summer we will be working more closely with the Investor Owned Utilities to understand the quantities available in each program and how are they being used by the utilities.

Real-time experience with interruptible programs has shown that some of the programs are more reliable than others. Last summer in our July heat wave, customers had a good indication that Monday July 24th was going to be a hot day. Some of the customers decided to not use their non-firm load or curtailed to their firm load prior to the Stage 2 declaration. Although these customers met their commitment this drop in load did not appear in real-time, it had already been curtailed. Performance like this must be considered in the forecasting models.

2. What is the latest research and opinion on the firmness, sustainability and reliability of demand resources; measurement and verification (M&V) protocols; customer load forecasts; customer baseline estimation; and the potential for free-ridership?

In the area of Demand Response firmness and sustainability and reliability, we are excited about a lot of the research happening in the Demand Response arena. We have worked closely with one such project funded by the State where specific circuits are being monitored that houses equipped with two-way communication air-conditioning cycling devices. This research is demonstrating that Load can be curtailed in these programs in a matter of seconds, supporting the ability of a program like this to participate in spinning Ancillary Services. In addition the researchers are gathering significant data on the technical characteristics of the circuit with many residential customers involved in the program, as well as shedding additional light on the process of marketing and enrolling customers. This summer the research is continuing with additional circuits and additional homes involved.

3. Are the approaches and principles that have been used historically to measure and verify savings from energy efficiency applicable to wholesale demand response resources? If they are not, what changes are needed to make them applicable?

The question of measurement is difficult. In California a specific working group is attacking this problem and will make recommendations to the California Public Utility Commission. We will be working with this working group explaining our market rules as well as market results. We look to our Department of Market Monitoring to help in the area of identifying principles of measuring the value of Demand Response in the wholesale market.

4. If demand resources are providing capacity resources or serving as an alternative or complement to transmission expansion, what are the key factors that need to be measured and verified, and at what level of precision? Can the current form and precision of measurement and verification approaches be utilized or are new approaches needed?

The CAISO does not have significant experience in the area of Demand Response providing capacity resources. In addition, we have not identified any protocols for evaluating Demand Response in our transmission expansion reviews. Clearly this is an area to begin to discuss with the Stakeholders, especially as the Demand Response Programs begin to grow and consistent Demand Response is derived from these products.

5. Should there be uniformity on how demand resources are measured and verified across markets?

Yes. It is important that we measure and verify Demand Response based on the product being delivered. By defining the characteristics of the product and reaching uniformity on these characteristics, then the measurement and

verification could be the same across markets. Uniformity in the measurement, in this case, would promote certainty within companies that have facilities in different markets as well as reduce hurdles for third party aggregators who want to work in multiple markets. Uniformity would support business' risk assessments, which must consider consistency, cost reduction, and energy needs. I would believe that when one considers developing an industry around Demand Response- the more standardization the better. Our goal should be that as much as possible, we have a standard protocol to measure Demand Response, such as we have with the Generators.